WHAT IS CLAIMED IS:

1. A signal processor comprising:

a detector for receiving a first signal which travels along a first propagation path and a second signal which travels along a second propagation path, a portion of said first and second propagation paths being located in a propagation medium, wherein said first signal has a first desired signal portion and a first undesired signal portion and said second signal has a second desired signal portion and a second undesired signal portion, wherein said first and second undesired signal portions are a result of a perturbation of said propagation medium; and

a reference processor having an input for receiving said first and second signals wherein said processor is adapted to combine said first and second signals to generate a reference signal having a primary component which is a function of said first and said second undesired signal portions.

2. The apparatus of Claim 1 further comprising an adaptive signal processor for receiving said reference signal and said first signal and for deriving therefrom an output signal having a primary component which is a function of said first desired signal portion of said first signal.

3. The apparatus of Claim 1 further comprising an adaptive signal processor for receiving said reference signal and said second signal and for deriving therefrom an output signal having a primary component which is a function of said second desired signal portion of said second signal.

4. The apparatus of Claim 2, wherein said adaptive signal processor comprises an adaptive noise canceler.

5. The apparatus of claim 4, wherein said adaptive noise canceler comprises a joint process estimator.

6. The apparatus of Claim 5 wherein said joint process estimator comprises a least-squares-lattice predictor and a regression filter.

7. The apparatus of Claim 1 wherein said detector further comprises a sensor for sensing a physiological function.

8. The apparatus of Claim 7 wherein said sensor comprises a light sensitive device.

9. The apparatus of Claim 7 further comprising a pulse oximeter for measuring oxygen saturation in a living organism.

10. A physiological monitoring apparatus comprising:

a detector for receiving a first physiological measurement signal which travels along a first propagation path and a second physiological measurement signal which travels along a second propagation path, a portion of said first and second propagation paths being located in a propagation medium, wherein said first signal has a first desired signal portion and a first undesired signal portion and said second signal has a second desired signal portion and a second undesired signal portion: and

a reference processor having an input for receiving said first and second signals wherein said processor is adapted to combine said first and second signals-to generate a reference signal having a primary component which is a function of said first and said second undesired signal portions.

11. The apparatus of Claim 10 further comprising an adaptive signal processor for receiving said reference signal and said first signal and for deriving therefrom an output signal having a primary component which is a function of said first desired signal portion of said first signal.

12. The apparatus of Claim 10 further comprising an adaptive signal processor for receiving said reference signal and said second signal and for deriving therefrom an output signal having a primary component which is a function of said second desired signal portion of said second signal.

13. The apparatus of claim 11 wherein said adaptive signal processor comprises an adaptive noise canceler.

14. The apparatus of Claim 13 wherein said adaptive noise canceler comprises a joint process estimator.

15. The apparatus of Claim 14 wherein said joint process estimator comprises a least-squares-lattice predictor and a regression filter.

16. The apparatus of Claim 10 wherein said detector further comprises a light sensitive device.

17. The apparatus of Claim 10 further comprising a pulse oximeter.

18. An apparatus for measuring a blood constituent comprising:

an energy source for directing a plurality of predetermined wavelengths of electromagnetic energy upon a specimen:

a detector for receiving said plurality of predetermined wavelengths of electromagnetic energy from said specimen and producing electrical signals corresponding to said predetermined wavelengths in response thereto, wherein at least two of said electrical-signals each has a desired signal portion and an undesired signal portion; and

a reference processor having an input for receiving said electrical signals wherein said processor is configured to combine said electrical signals to generate a reference signal having a primary component which is derived from said undesired signal portions.

19. The apparatus of Claim 18 further comprising an adaptive signal processor for receiving said reference signal and one of said at least two said electrical signals and for deriving therefrom an output signal having a primary component which is a function of said desired signal portion of said electrical signal.

20. The apparatus of Claim 19, wherein said adaptive signal processor comprises an adaptive noise canceler.

21. The apparatus of Claim 20, wherein said adaptive noise canceler comprises a joint process estimator.

22. The apparatus of Claim 21 wherein said joint process estimator comprises a least-squares-lattice predictor and a regression filter.

23. *A* blood gas monitor for non-invasively measuring a blood constituent in a body comprising:

a light source for directing at least two predetermined wavelengths of light upon a body: a detector for receiving said light from said body and, in response thereto, producing at least two electrical signals corresponding to said at least two predetermined wavelengths of light, wherein said at least two

electrical signals each has a desired signal portion and an undesired signal portion: and a reference processor having an input for receiving said at least two electrical signals wherein said processor is adapted to combine said at least two electrical signals to generate a reference signal with a primary component which is derived from said undesired signal portions.

24. The blood gas monitor of claim 23 further comprising an adaptive signal processor for receiving said reference signal and said two electrical signals and for deriving therefrom at least two output signals which are substantially equal, respectively, to said desired signal portions of said electrical signals.

25. The apparatus of Claim 24 wherein said adaptive signal processor comprises an adaptive noise canceler.

26. The apparatus of Claim 25, wherein said adaptive noise canceler comprises a joint process estimator.

27. The apparatus of Claim 26, wherein said joint process estimator comprises a least-squares-lattice predictor and a regression filter.

28. A method of determining a noise reference signal from a first signal comprising a first desired signal portion and a first noise portion and a second signal comprising a second desired signal portion and a second noise portion comprising the steps of:

selecting a signal coefficient which is proportional to a ratio of predetermined attributes of said first desired signal portion and predetermined attributes of said second desired signal portion;

inputting said first signal and said signal coefficient into a signal multiplier wherein said first signal is multiplied by said signal coefficient thereby generating a first intermediate signal; and

inputting said second signal and said first intermediate signal into a signal subtractor wherein said first intermediate signal is subtracted from said second signal thereby generating a noise reference signal having a primary component which is derived from said first and second noise signal portions.

29. The method of Claim 28 wherein said first and second signals are derived from light energy transmitted through an absorbing medium.

30. A physiological monitoring apparatus comprising:

means for acquiring a first signal comprising a first desired signal portion and a first undesired signal portion and a second signal comprising a second desired signal portion and a second undesired signal portion;

means for determining from said first and second signals a noise reference signal; and

an adaptive noise canceler having a noise reference input for receiving said noise reference signal and a signal input for receiving said first signal wherein said adaptive noise canceler, in real or near real time, generates an output signal which approximates said first desired signal portion.

31. The physiological monitoring apparatus as defined in claim 30 wherein said adaptive noise canceler further comprises a joint process estimator.

32. The physiological monitoring apparatus as defined in claim 31 wherein said joint process estimator further comprises a least-squares lattice predictor in conjunction with a regression filter.

33. An apparatus for processing an amplitude modulated signal having a signal amplitude complicating feature comprising:

an energy source for directing electromagnetic energy upon a specimen;

a detector for acquiring a first amplitude modulated signal and a second amplitude modulated signal, wherein each of said first and second signals has a component containing information about the attenuation of electromagnetic energy by the specimen and. a signal amplitude complicating feature;

a reference processor for receiving said first and second amplitude modulated signals and deriving therefrom a noise reference signal which is correlated with the signal amplitude complicating feature; and

an adaptive noise canceler having a signal input for receiving said first amplitude modulated signal, a noise reference input for receiving said noise reference signal, wherein said adaptive noise canceler produces an output signal having a primary component which is derived from said component containing information about the attenuation of electromagnetic energy by the specimen.

34. The apparatus as defined in Claim 33 wherein said adaptive noise canceler further comprises a joint process estimator.

35. The apparatus as defined in Claim 34 wherein said joint process estimator further comprises a least-squares lattice predictor in conjunction with a regression filter.

36. An apparatus for extracting a plethysmographic waveform from an amplitude modulated signal having a signal amplitude complicating feature comprising:

a light source for transmitting light into an organism;

a detector for monitoring light from said organism to produce a first light attenuation signal and a second light attenuation signal, wherein each of said first and second light attenuation signals has a component which is representative of a plethysmographic waveform and a component which is representative of the signal amplitude complicating feature;

a reference processor for receiving said first and second light attenuation signals and deriving therefrom a noise reference signal, wherein said noise reference signal and said signal amplitude complicating feature each has a frequency spectrum, said frequency spectrum of said noise reference signal being correlated with the frequency spectrum of said signal amplitude complicating feature; and

an adaptive noise canceler having a signal input for receiving said first attenuation signal, a noise reference input for receiving said noise reference signal, wherein said adaptive noise canceler produces an output signal having a primary component which is derived from said component which is representative of a plethysmographic waveform.

37. The apparatus as defined in Claim 36 wherein said adaptive noise canceler further comprises a joint process estimator.

38. The apparatus as defined in Claim 37 wherein said joint process estimator further comprises a least-squares lattice predictor in conjunction with a regression filter.

39. A method of removing a motion artifact signal from a signal derived from a physiological measurement comprising the steps of:

acquiring a first signal having a physiological measurement component and a motion artifact component and a second signal having a physiological measurement component and a motion artifact component; and

deriving from said first and second signals a motion artifact noise reference signal which is a primary function of said first and second signals motion artifact components.

40. A method as defined in Claim 39 further comprising the step of inputting said motion artifact noise reference signal into an adaptive noise canceler to produce an output signal which is a primary function of said first signal physiological measurement component.